

REMARKS/ARGUMENTS

Introduction:

Claims 43, 51, 52, 54, 56, 57, 60, 61, 63-65, 74, 77, 80, 81, 93-95, and 96 are amended, and claims 1-42, 44-47, 50, 58, 66-73, and 82-92 are canceled. In addition, claims 102-107 are newly added. Claims 43, 48, 49, 51-57, 59-65, 74-81, and 93-107 are now pending in the application. Applicants respectfully request reexamination and reconsideration of the application in light of the following remarks.

Rejection In View Of Littlebury:

Claims 43, 48, 49, 51-57, 59-65, and 74-101 were rejected under 35 USC § 102(b) as anticipated by US Patent No. 5,012,187 to Littlebury ("Littlebury"). Claims 82-92 are canceled, mooted the rejection of those claims. Applicants respectfully traverse the rejection of claims 43, 48, 49, 51-57, 59-65, 74-81, and 93-101.

The Examiner correctly notes that the pending claims are in product-by-process format, and product-by-process claims are patentable—not if the process recited in the claim is novel and non-obvious—but if the product produced by the recited process is novel and non-obvious. In the Amendment dated June 6, 2006, Applicants identified characteristics of the scrub marks on terminals of the claimed semiconductor device as a feature that distinguishes the semiconductor device of claims 43, 48, 49, 51-57, 59-65, 74-81, and 93-101 from prior art semiconductor device. Rather than determine whether the scrub marks distinguish the claimed semiconductor device, the Examiner dismissed Applicants arguments on the grounds that the scrub marks are not recited in the claims.

A threshold issue is therefore whether, in product-by-process claims, the structural feature that distinguishes the product from the prior art must be positively recited in the claims. Applicants respectfully submit that it does not, and the Examiner was in error to dismiss Applicants arguments regarding scrub marks as a structural feature that distinguishes the semiconductor device of the product-by-process claims in the instant application.

Product-by-process claims are examined differently than any other type of claim. Although the Examiner's statement that the feature relied on to distinguish a claim must be recited in the claim is correct for most types of claims, it is not correct for product-by-process claims. As stated in the MPEP, an examiner must consider "[t]he structure *implied by* the

process steps" in determining whether a product-by-process claim is patentable. (MPEP § 2114, 1st complete paragraph in column 1 on pg. 2100-52 (emphasis added).) The MPEP further states expressly that a product-by-process claim "*may recite only process limitations*," but an examiner must nevertheless compare structural features implied by the process limitations to determine the patentability of the claims. (MPEP § 2114, paragraph on pg. 2100-52 under the heading "The Use Of 35 U.S.C. 102/103 Rejections For Product-By-Process Claims Has Been Approved By The Courts.") Thus, per the MPEP, Applicants need not recite distinguishing structural features of the claimed semiconductor device in the claims themselves. Rather, it is sufficient that the distinguishing structural features be implied by the process steps recited in the claims.

The Examiner was thus in error to dismiss the scrub mark features of the semiconductor device of the pending claims solely because those scrub mark features are not expressly recited in the claims. Rather, as long as the scrub mark features are implied from the process steps recited in the claims, the Examiner must consider whether the scrub mark features distinguish the semiconductor device of the instant claims from Littlebury. As discussed in the Amendment dated June 6, 2006, and as further discussed below, distinguishing scrub mark features are necessarily made in the semiconductor device of the instant claims by operation of the recited process, and those scrub mark features are not found in Littlebury. The instant claims are therefore patentable over Littlebury.

As discussed in Applicant's previous Amendment dated June 6, 2006, the process recited in the claims of this application gives rise to structural differences in the resulting tested semiconductor device as compared to prior art semiconductor dies like Littlebury. Exhibit 1 attached hereto illustrates a depiction of exemplary probe elements attached to an exemplary probe substrate. In Figure A of Exhibit 1, the probe elements and the terminals of a semiconductor device are apart. In Figure B, the probe elements and/or the terminals are moved and brought into contact with each other. As shown in Figure C, the probe elements and/or the terminals can be moved past first contact so that the probe elements compress and exert forces against the terminals. Such a force can aid in creating electrical connections between the probe elements and the terminals. Typically, the probe elements create marks, which are often called scrub marks, on the terminals, and the size of each scrub mark is typically proportional to the force exerted by a probe element against the terminal.

Because of the "adjusting a planar orientation of probe elements of a probe card assembly to correspond to a planar orientation of said electrical contact terminals" recited in claim 43, the probe elements of claim 43 can be adjusted to be generally co-planar with respect to the terminals of the semiconductor device prior to effecting contact between the probe elements and the terminals. For this reason, the forces exerted by the probe elements against the terminals will be generally similar from probe to probe. Consequently, the scrub marks made by the probe elements will be generally uniform from terminal to terminal as depicted in Figure D. (Figure D shows a top view of the semiconductor device, which is shown in side view in Figures A-C.)

In contrast, a semiconductor device tested using a process that does not include "adjusting a planar orientation of probe elements of a probe card assembly to correspond to a planar orientation of said electrical contact terminals" will have irregular scrub marks from terminal to terminal. Figures E-G in Exhibit 2 (which is attached hereto) show probe elements that are out of planarity with terminals of a semiconductor device. As a result, the probe element on the left hand side in Figures E-G is the first probe element to contact a terminal, and the probe element on the right hand side is the last probe element to contact a terminal, as shown in Figure F. As shown in Figure G, as all of the probe elements are brought into contact with the terminals, the probe elements on the left hand side are compressed to a greater degree than the probe elements on the right hand side, which means each probe element exerts a different level of force against a terminal. As shown in Figure H (which shows a top view of the semiconductor device), the resulting pattern of scrub marks left on the terminals is not uniform. Rather, the probes that exerted larger forces leave larger scrub marks. The resulting pattern can be a pattern of increasingly larger scrub marks from the right-most terminal moving toward the left-most terminal.

Littlebury discloses no mechanism for adjusting an orientation of probes 17 to correspond to an orientation of the terminals 13 of chips 12A, 12B. Rather, Littlebury relies solely on the flexibility of membrane 16 to compensate for mis-orientation of probes 17 and terminals 13 as the probes 17 are brought into contact with the terminals 13. Thus, in Littlebury, ones of probes 17 will contact ones of terminals 13 at different times with effects similar to what is shown in attached Exhibit 2. Littlebury's dies will thus have less uniform, less regular scrub marks.

Thus, the tested semiconductor device of claim 43 is structurally different than a semiconductor device tested using a prior art process—e.g., the dies disclosed in Littlebury—that

lacks the "adjusting a planar orientation of probe elements of a probe card assembly to correspond to a planar orientation of said electrical contact terminals" recited in claim 43. That is, the tested semiconductor device of claim 43 has a more uniform, regular pattern of scrub marks on its terminals; in contrast, a prior art semiconductor device—like the dies in Littlebury—will have a pattern of scrub marks on its terminals that is not uniform.

Moreover, uniform, regular scrub marks are more advantageous than irregular scrub marks. This is because scrub marks on terminals of a semiconductor device can cause several problems. First, scrub marks can prevent a wire from being bonded to a terminal. (The terminals of a semiconductor device are often connected to conductors of a protective package by wires.) Second, even if a wire is successfully bonded to a terminal with a scrub mark, the scrub mark can decrease the effective life of the bond between the wire and the terminal. Third, a scrub mark can weaken a terminal, causing the terminal to loosen or even detach from the semiconductor device. (See U.S. Patent No. 5,506,499 to Puar ("Puar"), col. 2, lines 21-40 and col. 3, lines 7-25 for a discussion of the detrimental effects of scrub marks.) Increasing the uniformity of the scrub marks across terminals of a semiconductor device can reduce the foregoing problems. For example, increasing the uniformity of the scrub marks typically prevents the formation of large scrub marks, which are particularly detrimental.

Indeed, the lack of uniformity in scrub marks left on a die by a probe card assembly that is not precisely planarized with the die is recognized in the industry as a problem, as evidenced by U.S. Patent No. 5,861,759 to Bialobrodski et al. ("Bialobrodski").¹ (See Bialobrodski col. 1, lines 14-23; col. 3, lines 23-33; and Figure 4.) That precisely planarizing the probes of the probe card assembly with the die produces a die that has generally uniform scrub marks and is therefore different and better than a prior art die tested with a probe card assembly that is not precisely planarized with the die is known in the industry is also evidenced by Bialobrodski. (See Bialobrodski col. 3, lines 34-44.)

Applicants assert that the foregoing differences between the tested semiconductor device produced by the method of independent claim 43 and Littlebury's dies render claim 43 patentable over Littlebury.

¹ Applicants note that Bialobrodski, which was not filed until January 29, 1997, is not prior art to the present application, which claims priority through a chain of continuation and divisional applications to U.S. Patent No. 5,974,662, which was filed on November 9, 1995.

Claims 48, 49, 51-57, 59-65, 74-81, and 93-107 depend from claim 43 and are, at least because of this dependency, patentable over Littlebury. In addition, new claims 103-107 recite process features relating to fabricating the probes to have contact tips disposed in a uniform plane. The uniformity of the plane in which the contact tips of the probes are fabricated further contributes to uniform scrub marks. The process recitations in claims 103-107, as well as others of the dependent claims, further implies the creation of uniform scrub marks on the terminals of the claimed semiconductor device and thus further distinguishes over Littlebury.

Rejection In View Of Aldaz, Khoury, And Parrish:

Claims 43 and 82 were rejected under 35 USC 102(e) as anticipated by US Patent Publication No. 2002/0057098 to Aldaz et al. ("Aldaz"), US Patent No. 6,441,629 to Khoury et al. ("Khoury"), and US Patent No. 6,215,320 to Parrish ("Parrish"). Although claim 82 is canceled, mooted the rejection of claim 82, Applicants respectfully traverse these rejections with respect to claim 43 on the grounds that Aldaz, Khoury, and Parrish are not prior art to the instant application.

Specifically, the filing dates of Aldaz, Khoury, and Parrish do not pre-date the priority date of the instant application, which is November 9, 1995. Aldaz was filed on June 20, 2001 and is a continuation-in-part claiming priority to an application filed on May 31, 2000. Khoury was filed on May 31, 2000, and Parrish was filed on October 23, 1998. Applicants therefore request that the rejections based on Aldaz, Khoury, and Parrish be withdrawn.

Double Patenting Rejection:

Claims 43, 48, 49, 51-57, 59-65, and 74-101 were rejected on the grounds of obviousness-type double patenting in view of US Patent No. 5,974,662 to Eldridge et al. ("Eldridge"). Claims 82-92 are canceled, mooted the rejection of those claims. Applicants respectfully traverse, however, the rejection of claims 43, 48, 49, 51-57, 59-65, 74-81, and 93-101.

First, Applicants assert that the Examiner has not established a *prima facie* case for obviousness. As stated in the MPEP, to establish a *prima facie* case of obviousness between claims 27 and 35 of Eldridge, on one hand, and the claims of the instant application, on the other hand, the Examiner must identify the differences between claims 27 and 35 of Eldridge and the

claims of the instant application. In addition, the Examiner must explain why a person of ordinary skill in the field would find those differences to be obvious. (MPEP § 804, section entitled "I. Obviousness-type" on pg. 800-21.) Here, the Examiner has not identified differences between claims 27 and 35 of Eldridge, on one hand, and the claims of the instant application, on the other hand, nor has the Examiner explained why a person of ordinary skill in the field would find those differences to be obvious. The Examiner has therefore not established a prima facie case for obviousness. The double patenting rejection should therefore be withdrawn.

Second, it is unclear how or why claims directed to a "method of altering the orientation of probe elements for probing semiconductor devices," as expressly stated in claims 27 and 35 of Eldridge, are "substantially similar" to semiconductor devices, which is the subject matter of claims 43, 48, 49, 51-57, 59-65, 74-81, and 93-101 of the instant application. Indeed, absent supporting evidence and argument, the Examiner's statement that the subject matter of claims 27 and 35 of Eldridge is "substantially similar subject matter" to a semiconductor device is conclusory and unsupported. For this additional reason, the double patenting rejection should be withdrawn.

In view of the foregoing, Applicants submit that all of the claims are allowable and the application is in condition for allowance. If the Examiner believes that a discussion with Applicants' attorney would be helpful, the Examiner is invited to contact the undersigned at (801) 323-5934.

Respectfully submitted,

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By /N. Kenneth Burraston/
N. Kenneth Burraston
Reg. No. 39,923

Kirton & McConkie
1800 Eagle Gate Tower
60 East South Temple
P.O. Box 45120
Salt Lake City, Utah 84111-1004
Telephone: (801) 323-5934
Fax: (801) 321-4893

Exhibit 1

Figure A

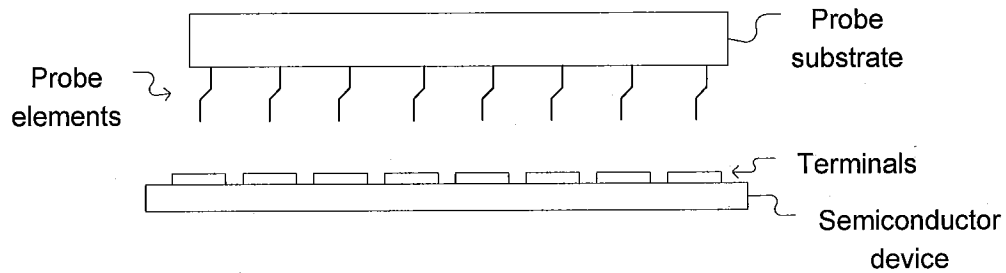


Figure B

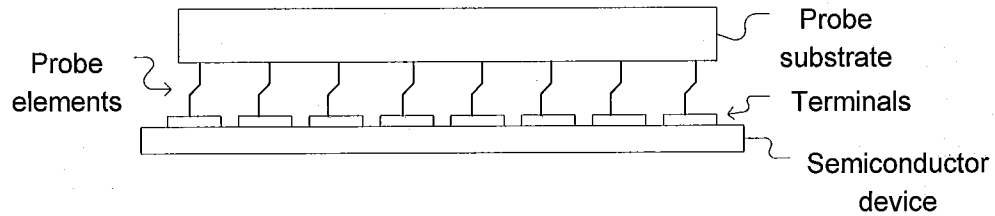


Figure C

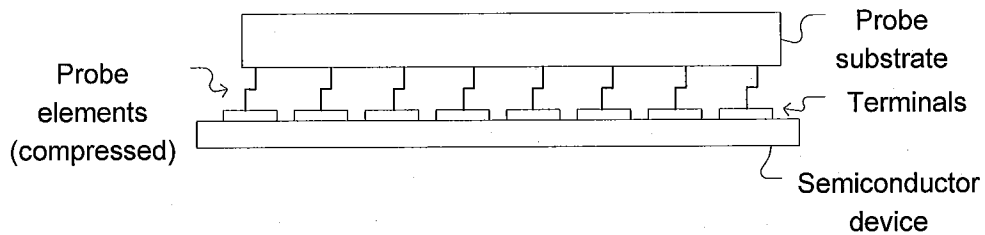


Figure D

(Top View)

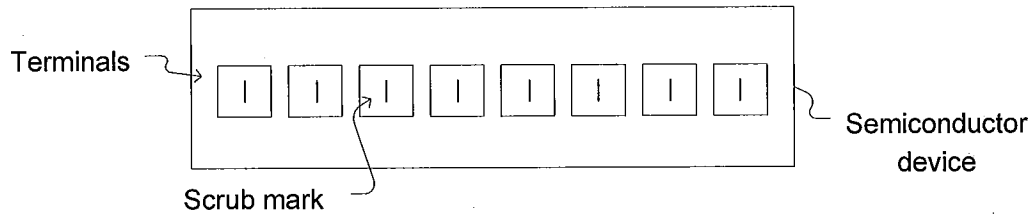


Exhibit 2

Figure E

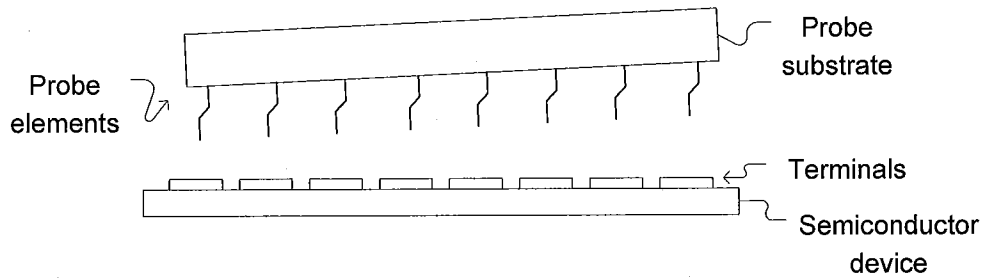


Figure F

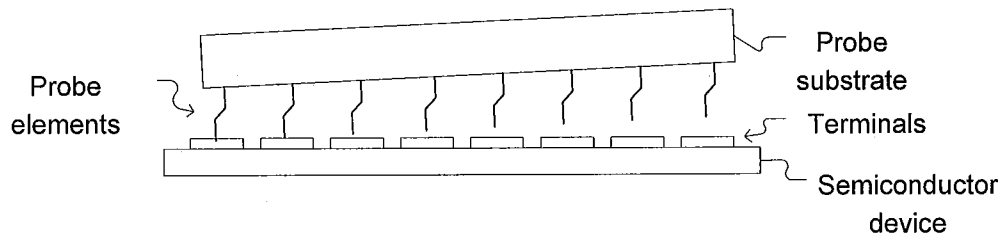


Figure G

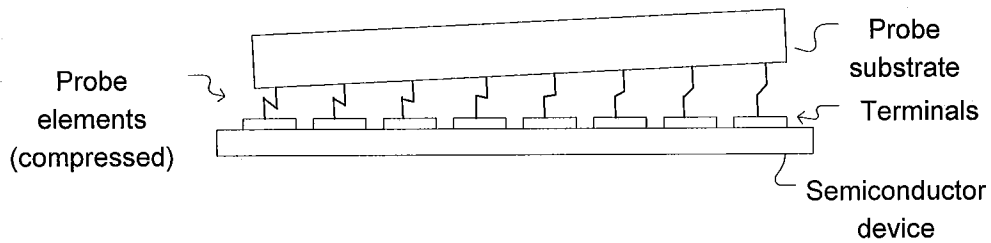


Figure H

(Top View)

